Abstract

The present work reports the investigation of surface morphology, elemental composition, phase changes and field emission properties of Si ion irradiated Nickel (Ni) and Titanium (Ti). The Ni and Ti targets have been irradiated with 500 KeV Si ions generated by Pelletron accelerator at various fluences ranging from 6.9×10^{13} to 77.1×10^{13} ions/cm^2. Growth of the induced surface structures have been analyzed by using Field Emission Scanning Electron Microscopy (FESEM) analysis. In case of Ni, as the ion fluence rises from 6.9×10^{13} to 65.8×10^{13} ions/cm^2, the formation of spherical particulates, agglomers and sputtering is observed. While in the case of Ti, with the rise of ion fluence from 11.6×10^{13} to 77.1×10^{13} ions/cm^2, the development of particulates along with crater and sputtered channels is observed. X-ray Diffraction (XRD) analysis shows that no new phase is identified for ion irradiated materials. However, a significant increase in peak intensity is analyzed by changing the ion fluence. The variation in crystallite size and dislocation line density is also observed as a function of Si ion fluence. Fourier Transform Infrared Spectroscopy (FTIR) analysis shows that no new bands are formed after the Si ion irradiation. Field emission properties of ion-structured Ni and Ti are explored in diode configuration by measuring I-V characteristics of targets under UHV conditions. To confirm the superiority of FE behaviour of the measured I-V features, the Fowler-Nordheim plots are drawn.